



Safe and Clean

Fleet manager fact sheet

Fleet managers can play a major role in the success of *Clean Air Zone Idaho* through management decisions regarding maintenance and operations, retrofits, and purchasing.

Fleet Maintenance

How do you know if your vehicle needs maintenance?

Sometimes a bus that is running well may still need maintenance. But how can you tell? An opacity test has been developed to measure bus emissions by seeing how much light is blocked by the exhaust. Opacity testing can help determine if maintenance is necessary. Local auto repair shops or emission testing facilities may offer opacity testing. If your bus exceeds the following opacity levels, it could probably benefit from a small fix.

| | |
|----------------|-------------|
| 1973 and older | 70% opacity |
| 1974-1990 | 55% opacity |
| 1991 and newer | 40% opacity |

What maintenance should you perform?

Fixing any of these problems is usually the most effective way to reduce bus emissions and promote the health of children and driver:

| | |
|--|--------------------------------|
| Restricted air filter | Malfunctioning turbocharger |
| Clogged, worn or mismatched fuel injectors | Malfunctioning after cooler |
| Air manifold leaks | Maladjusted fuel rack |
| Faulty fuel injection pump | Defective air fuel controller |
| Defective or maladjusted puff limiter | Poor fuel quality |
| Low air box pressure | Improperly adjusted valve lash |
| Poor injector timing | Poor throttle control |

Tip: If opacity is high for three consecutive trials, it's probably a timing, valve, or air filter problem. If opacity starts high and decreases in each trial, it's probably an oil or fuel injector problem.

Why perform targeted maintenance?

Improving your maintenance program produces many benefits. First, maintenance reduces the amount of pollution emitted. Diesel emissions have been linked to asthma and cancer, so this is important for the health of kids on the bus and the bus driver. Secondly, a bus running in top shape will run more smoothly and can be used for a longer time. In fact, a bus that is well maintained can run up to a two years longer than a bus that receives less regular maintenance. Finally, an efficient bus will save you money by using less fuel!

If a school bus fleet has 20 buses and each bus reduced idling time by 20 minutes a day, at \$1.50/per gallon of fuel, the fleet would save \$900 a school year.

What Your School Can Do:

- ❑ Help support *Clean Air Zone Idaho* by reducing diesel emissions from school buses through maintenance and operations, retrofits, and purchasing decisions.
- ❑ Train bus drivers to understand and follow the idling guidelines.
- ❑ Arrange for a comfortable space inside each school building and/or bus depot where bus drivers can wait.
- ❑ Spot-check loading and unloading areas for adherence to the no-idle zone. Recognize and reward drivers who successfully reduce idling.

Fleet Operation and Planning

- Assign the cleanest buses in the fleet to the longest routes.
- Inform drivers that following other diesel vehicles too closely can contribute to higher concentrations of diesel exhaust inside and outside the bus. Encourage bus drivers not to “caravan.”
- Arrange bus departure times so that buses do not queue up for lengthy periods.
- Encourage children to sit in the front of the bus if the bus is not full.
- Examine the layout of the loading areas for each school. Reconfigure to reduce queuing, idling, and front-to-back movement of air pollutants.

Typical Bus Parking Style



Alternative Parking Style



Retrofits: Updating Existing Vehicles

Several technology options are available to reduce school bus emissions:

Oxidation Catalyst Retrofit: An oxidation catalyst is a type of advanced catalytic converter for diesel vehicles and is installed much like a muffler. The cost of an oxidation catalyst ranges from \$1,000 to \$2,000. Oxidation catalysts can perform with regular diesel, biodiesel, or ULSD fuel and can reduce fine particulate matter (PM) by an additional 20-30%, hydrocarbons up to 50%, and carbon monoxide (CO) up to 40%.

Particulate Filter Retrofit: A particulate filter is installed between the engine and the exhaust pipe on a diesel-powered bus. The filters are very effective in reducing emissions, with reductions of 60-90% for fine PM as well as reductions for CO and volatile organic compounds. The average cost of a particulate filter ranges from \$3,000 to \$5,500 per vehicle. To be effective ULSD must be used, which increases the emissions benefit even further.

Other retrofits: Rewiring the circuitry in the bus enables overhead flashing lights and other safety equipment operate without running the engine. This can help reduce idling. Additionally, auxiliary heaters can be used to warm up engines and passenger compartments in colder climates. This equipment runs off the school bus fuel tank or off electric outlets and includes a timer that can be programmed to automatically start the heating function.

Purchasing: Cleaner Options for New Vehicles

Clean Diesel Technology Engines: A few engine manufacturers are already making new diesel engines that meet or exceed the more stringent engine standards that become effective for model year 2007 diesel trucks and buses. These engines typically require Ultra Low Sulfur Diesel (ULSD) fuel. With this combination, fine PM is reduced by up to 95%.

Natural Gas and Propane Engines: Overall, the fastest-growing types of “non-conventional” buses are those powered by natural gas or propane. Natural gas buses have been popular with mass transit districts across the country. Natural gas buses account for nearly one-third of all new mass transit bus orders in the nation. While the majority of bus applications for these fuels have been with mass transit districts, several school districts across the country have implemented natural gas and propane-powered buses.

Common Myths about Engine Idling

Myth: It's important to warm up the engine with a long idle period, especially in cold weather.

Fact: Bus and engine manufacturers routinely suggest a warm-up time of less than five minutes. In fact, running an engine at low speed (idling) causes significantly more wear on internal parts compared to driving at regular speeds.

Myth: The engine must be kept running to operate the school bus safety equipment (flashing lights, stop sign). It's impossible to run this equipment off the internal circuitry of the bus because the battery will run down.

Fact: Safety equipment can be operated through rewired circuitry without the engine idling for up to an hour with no ill-effects on the electrical system of the bus.